

Total Maximum Daily Load Information Sheet

Cedar Creek

Waterbody Segment at a Glance:

County: Callaway
Nearby Cities: Columbia and Kingdom City
Length of impairment: 4 miles
Pollutant 1: pH (4 miles)
Pollutant 2: Sulfate (1 mile)
Source: Cedar Creek Abandoned Mine Land (AML)



State map showing location of watershed

TMDL Priority Ranking: TMDL Completed 2001

Description of the Problem

Beneficial uses of Cedar Creek

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life
- Protection of Human Health associated with Fish Consumption

Use that is impaired

- Protection of Warm Water Aquatic Life

Standards that apply

- Missouri's Water Quality Standards (WQS), 10 CSR20-7.031 Section (4)(E), state that water contaminants shall not cause pH to be outside of the range of 6.5-9.0 SU (Standard Units).
- Sulfate and chloride are linked together in the (WQS). Section (4)(L)1 states that the concentration of chloride plus sulfate in streams with a 7Q10 low flow less than one cubic foot per second shall not exceed 1000 milligrams per liter (mg/L) for protection of aquatic life.

Background Information and Water Quality Data

An area of approximately 1200 acres on Upper Cedar Creek straddling the Boone-Callaway county line just north of Interstate 70 was strip-mined for coal by the Marriot-Reed Coal Company between 1941 and 1962 (see area between monitoring sites 1 and 3 on map). Sulfide minerals, common in coal and the surrounding rock, oxidize in the presence of water and oxygen to form highly acidic (low pH), iron- and sulfate-rich drainage. Both low pH and high levels of sulfate are harmful to aquatic life. Heavy rains over this area flushed acid water from pits within the Upper Cedar Creek mining area and caused frequent fish kills in Cedar Creek.

Multiple seeps of contaminated water from this area continually entered Cedar Creek in the upstream-most half mile of the impaired portion. This seriously degraded 14 miles of the creek. From 1982 to 1990, at a cost of \$4.7 million, the Missouri Department of Natural Resources reclaimed this area. Following this reclamation project, fish and other aquatic life returned to almost all of the previously polluted 14 miles of stream and since the reclamation there have been no fish kills. However, four miles of the creek still occasionally did not meet the 6.5 pH Missouri standard, and conditions indicated elevated sulfate as well.

To address these remaining problems, a smaller reclamation project was completed in 2002. This project built alkaline (high pH) producing cells from crushed limestone and an organic (soil and plant material) layer in order to maintain a pH of 6.5 – 9.0 in the runoff. These cells act like small wetlands. The organic layer in these cells will also lower the sulfate concentration. Many acres of the Upper Cedar Creek mined lands area have been planted with native grasses and trees. Post construction monitoring in Cedar Creek will reveal how well the cells are working and whether further measures are needed. The U.S. Environmental Protection Agency approved the TMDL Jan. 30, 2001. A map of the area and a table of water quality data are shown below.

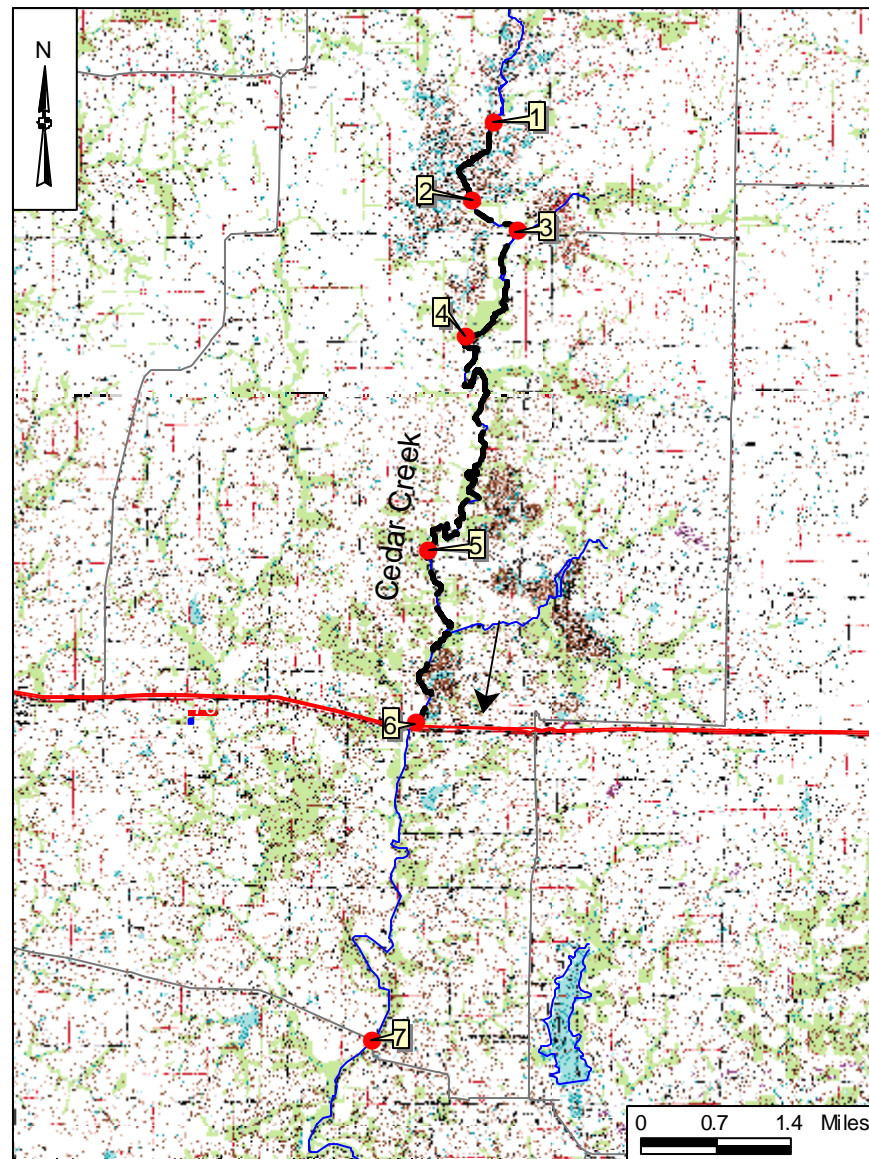
Median pH and Mean Alkalinity and Sulfate Levels in Cedar Creek Prior to and After Land Reclamation of Abandoned Coal Mined Areas.								
Site No.	Data Prior to 1983				Data After 1988			
	pH	Alkalinity (mg/L)	Sulfate (mg/L)	SO ₄ +Cl (mg/L)	pH	Alkalinity (mg/L)	Sulfate (mg/L)	SO ₄ +Cl (mg/L)
1	7.0	72	138		7.3	95	125	142
3	6.0	24	448		7.1	67	449	460
4					7.2	75	362	373
5	6.1	16	467		7.4	65	324	335
6	4.6	8	677		6.8	55	402	417
7	6.5	41	446	455	7.6	86	238	253

Note: The lower pH and alkalinity and higher sulfate at Site 6 is the result of inflows of water from Manacle Creek, a tributary of Cedar Creek that is affected by acid mine drainage from a separate abandoned coal mined area, the Manacle Creek area. This area will have a separate TMDL developed for it, scheduled for 2004. Bold values are exceedences of state water quality standards.

Index to Sample Sites in Map Below

- 1 - Cedar Cr. at north end of Cedar Cr. AML area
- 2 - Cedar Cr. within Cedar Cr. AML area
- 3 - Cedar Cr. at south end of Cedar Cr. AML area
- 4 - Cedar Cr. 1.2 mi. below Cedar Cr. AML area
- 5 - Cedar Cr. 3.5 mi. below Cedar Cr. AML area
- 6 - Cedar Cr. at I-70

Map of Cedar Creek in Boone and Callaway Counties, Missouri, with Sampling Sites



----- Impaired segment

→ Direction of flow

For more information call or write:

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